UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/699,126	10/30/2003	Mi-Suk Lee	3364P147	4970

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EXAMINER
HARPER, V PAUL

ART UNIT	PAPER NUMBER
2626	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/699,126	LEE ET AL.
	Examiner	**Art Unit**	
	V. Paul Harper	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☐ Responsive to communication(s) filed on _____.

2a) ☐ This action is **FINAL**.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-5* is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-5* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a) ☒ All   b) ☐ Some *   c) ☐ None of:

        1. ☒ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____.

        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
     Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
     Paper No(s)/Mail Date _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1.   The Examiner has considered the references listed in the Information Disclosure

Statement dated 10/30/07   A copy of the Information Disclosure Statement is attached

to this office action.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

2.   Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sohn

et al. ("A Statistical Model-Based Voice Activity Detection" IEEE Signal processing

Letters, Vol. 6, NO. 1, January 1999), hereinafter referred to as Sohn, and in view of

Martin ("Speech enhancement using MMSE short time spectral estimation with gamma

distributed priors" In: Proc. IEEE ICASSP. pp. 504-512 May 13-17, 2002.), hereinafter

referred to as Martin, and Gustavsson et al. ("Simultaneous channel and symbol

maximum likelihood estimation in Laplacian noise" ICSP 1998), hereinafter referred to

as Gustavsson.

Regarding **claim 1**, Sohn teaches a method for statistical model-based voice activity detection. Shon's teachings include:

- a fast frequency Fourier transformer for performing a fast Fourier transform on input speech to analyze speech signals of a time domain in a frequency domain (§II, ¶1, DFT of speech);

- a noise power estimator for estimating a power $\lambda_{n,k}(t)$ of noise signals from noisy speech X(k) of the frequency domain output from the fast frequency Fourier transformer (§II, ¶1, estimate speech, noise and noisy speech); and

- a likelihood ratio test (LRT) calculator for calculating a decision rule of voice activity detection (VAD) from the estimated power $\lambda_{n,k}(t)$ of noise signals from the noise power estimator ...(p. 1, col. 2, eqn. (3), likelihood ration calculation).

But Sohn does not specifically teach the use of a "complex Laplacian probabilistic statistical model [representing speech]" in the likelihood ratio test. However, the examiner contends that this concept was well known in the art, as taught by Martin.

In the same field of endeavor, Martin teaches the use of a Laplacian model for speech (§2.1 Statistical Models).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sohn by specifically replacing the Gaussian model used in the LRT with a Laplacian model, as taught by Martin, because it is well known in the art at the time of invention that the Laplacian model is an improvement over the Gaussian model when modeling speech (Martin, §2.1 Statistical Models ¶1).

But Sohn does not specifically teach the use of a "complex Laplacian probabilistic statistical model [representing noise]" in the likelihood ratio test. However, the examiner contends that this concept was well known in the art, as taught by Gustavsson.

In the same field of endeavor, Gustavsson teaches the use of a Laplacian model for noise (§1 Introduction, ¶2)

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Sohn by specifically replacing the Gaussian model used in the LRT with a Laplacian model, as taught by Gustavsson, because it is well known in the art at the time of invention that the Laplacian model is an improvement over the Gaussian model when modeling speech (Gustavsson, col. 1, ¶4, some noise environments are actually non-Gaussian and in these cases a Laplacian model might be a better representation).

Regarding **claim 2**, Sohn in view of Martin and Gustavsson teaches everything claimed, as applied above (see claim 1). In addition, Sohn teaches that the decision rule is given by the equation indicated in this claim (col. 2, eqn (3)).

Regarding **claim 3**, Sohn in view of Martin and Gustavsson teaches everything claimed, as applied above (see claim 2). In addition, Sohn in view of Martin teaches the equation given in claim 3 (note the equivalence indicated in the claimed equation and the fact that the right hand side equation necessary follows from the left hand side

equation [taught by Sohn] with the additional assumptions [use of Laplacian models] given by Martin and Gustavsson).

Regarding **claim 4**, this claim has limitations similar to claim 1 and is rejected for the same reasons.

Regarding **claim 5**, this claim has limitations similar to claims 2 and 3 and is rejected for the same reasons.

Citation of Pertinent Art

3.   The following prior art made of record but not relied upon is considered pertinent to the applicant's disclosure:

*   Zhang, Wei ("Speech Statistical Modelling and its Applications in Voice Activity Detector and Speech Enhancement" Thesis sumbitted to the Department of Electrical and Computer Engineering for a Master of Science; Queen's University, Kingston, Ontario, Canada, January 2002) teaches the use of Laplacian noisy speech model.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to V. Paul Harper whose telephone number is (571) 272-7605. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Edouard can be reached on (571) 272-7603. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

5/4/07

VPH

**V. PAUL HARPER
PRIMARY PATENT EXAMINER**